

GEOGRAPHICAL DISTRIBUTION OF STARLINGS BANDED AT STATE COLLEGE, PENNSYLVANIA

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Although several studies have been made of the migratory pattern of the starling (*Sturnus vulgaris*), none has analyzed movements of birds from the mountainous region of central Pennsylvania. The present paper describes the distribution of recoveries obtained from 8,058 birds banded by the authors in the immediate vicinity of State College, Pennsylvania (latitude 40°44'; longitude 77°55') through June 1966.

The starlings were captured for banding in three ways: (1) "Seth Low" all-purpose traps in backyard banding stations; (2) two "walk-in" traps set at feed lots on the University farms; (3) hand capture with fish nets at night from winter roosts in silos on farms of the University. One backyard station (22 percent of the birds) was operated continuously from 1950. The other backyard station (57 percent) was operated all year from 1956. Nine percent were caught at the silos during the winters of 1959-60 and 1960-61. The "walk-in" traps (12 percent) were operated the winters of 1964-65 and 1965-66.

Unlike many species, very few starlings became regular visitors at the backyard banding stations—feeding in open fields when possible. Large numbers were trapped only when there was snow cover on the ground. The projects on the University farms were in operation only during the winter months. Thus, most of the captured birds were members of the winter population.

Although the banding locations are 1-2 miles apart, interchanges of birds are so frequent that data from all stations have been grouped together. Therefore, repeats are birds captured at any of the locations within three months of the date of banding or last capture regardless of the exact location of banding. Returns are birds trapped and released at any banding station in State College after an absence of at least three months. The recoveries include any banded bird found dead in State College, Pennsylvania, and those retaken (alive or dead) outside of the immediate vicinity.

Since the main concern of this paper is in the movements of starlings away from State College, repeats have not been included in Table 1.

TABLE 1. RECORDS OF STARLINGS AT STATE COLLEGE, PENNSYLVANIA, 1950-1966

Number banded	8,058
Returns	194
Recoveries outside Pennsylvania	46
Recoveries in Pennsylvania outside State College	53
Recoveries in State College	87
Total recoveries	186

Figure 1. Locations of recoveries of starlings outside of Pennsylvania. A circled dot refers to multiple recoveries.

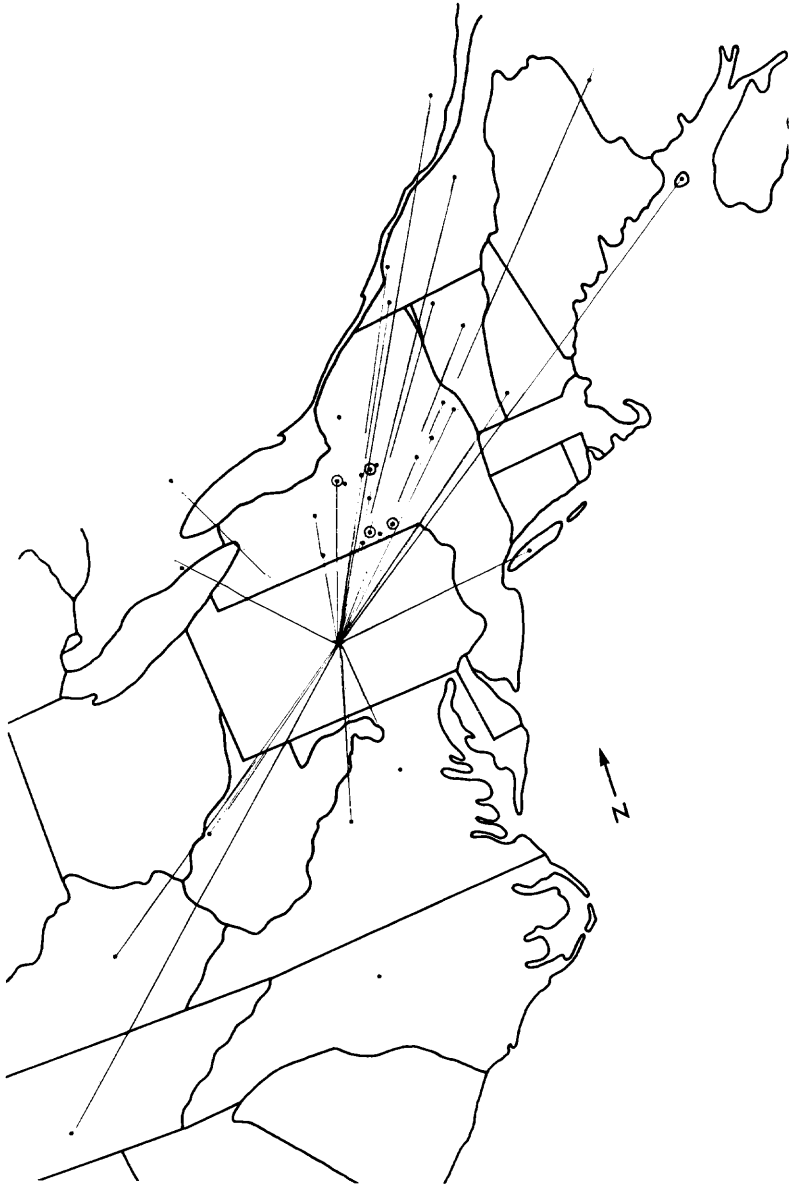
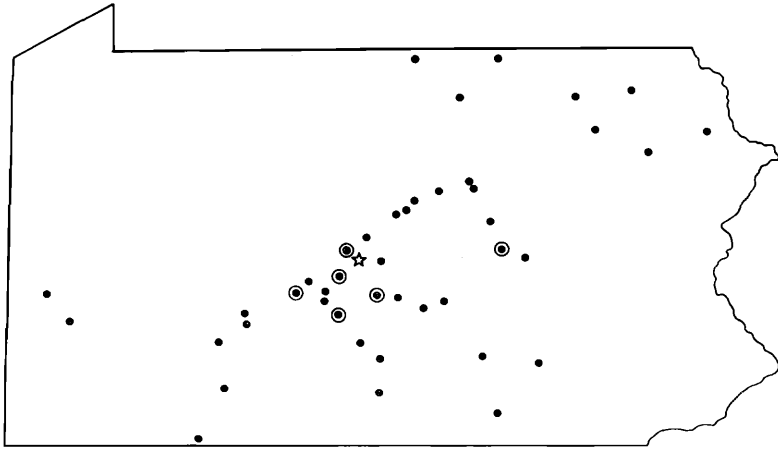


Figure 2. Locations of recoveries of starlings inside of Pennsylvania. The location (State College) of banding is given by the star.



Recovery points for the 46 out-of-state recoveries show a north-east to south-west movement (Fig. 1). Only four birds do not conform to a N.E.-S.W. pattern. Of these four, only the following one was a direct recovery. Bird #552-73257 banded 2 April 1962 was recovered in June 1962 in Queensville, Ontario, Canada.

Recoveries in Pennsylvania outside State College (Fig. 2) also follow the N.E.-S.W. trend. Perhaps the pattern is even more startling here since shorter distances are involved and some may be resident birds foraging over a wide area.

In common with other studies April through July inclusive was considered as the breeding season (Fig. 3). All except two of the out of state recoveries lie in a N.E. direction.

Davis (1960) suggests that some starlings in Pennsylvania are permanent residents. The local recoveries and returns were analyzed for evidence to support this hypothesis. Of the 87 local recoveries 39 were recovered during the season of banding so essentially were repeats and were not included in the analysis. The remaining 242 local recoveries and returns produced 18 birds (Table 2) assumed to be residents. Some of the 217 birds that were recaptured (as returns or recoveries) in succeeding winters after banding also could be permanent residents while others could be migrants. Unfortunately, since virtually none of the distant recoveries were released alive there has been little chance for a return of a bird known to have migrated.

The breeding population of starlings in the State College region is much smaller than is the winter population. Two possible explanations present themselves. First, the breeding population consists entirely of non-migratory birds. Second, the permanent



Figure 3. Locations of recoveries in the breeding season of birds banded at State College, Pennsylvania.

· Individual Recovery

⊙ Multiple Recovery

TABLE 2. DATES OF BANDING AND RECAPTURE OF STARLINGS IN STATE COLLEGE SHOW THAT SOME BIRDS ARE PERMANENT RESIDENTS SINCE THEY WERE PRESENT IN THE BREEDING SEASON (APRIL-JULY) AND IN THE WINTER (NOVEMBER-FEBRUARY).

Band Number	Date Banded	Date Recaptured	Category
622-94353	7 April 1963	30 June 1963 12 March 1964 2 February 1965	repeat return return
572-52472	9 December 1963	3 July 1964	recovery
512-39257	25 July 1958	26 January 1960	return
582-97468	20 January 1965	29 April 1966	recovery
702-03027	10 November 1965	27 May 1966	recovery
702-03188	24 November 1965	18 May 1966	recovery
532-64007	4 April 1957	16 February 1958 23 May 1960	return recovery
552-48583	15 December 1958	31 May 1959	recovery
552-48407	19 January 1959	26 January 1960 23 May 1960	return recovery
562-58050	1 January 1961	21 April 1963	recovery
562-58058	1 January 1961	19 July 1961	recovery
562-58582	10 December 1962	20 May 1963	recovery
662-94054	7 January 1963	July 1964	recovery
662-94059	9 January 1963	19 April 1963	recovery
662-94906	14 January 1964	30 May 1966	recovery
662-98083	11 January 1965	1 June 1966	recovery
652-64276	1 January 1965	18 March 1965 May 1966	repeat recovery
562-58144	11 December 1961	1 June 1962 3 February 1963 6 April 1963	return return recovery

resident population is augmented by migratory birds wintering farther to the southwest. More work must be done capturing and banding the breeding population to answer this question.

Only two birds have been caught by the authors that were banded outside of the area. An adult female banded in Washington, D.C. on 18 January 1963 was trapped and released 12 December 1963. A young bird banded at Hector, New York, on 23 May 1964 was trapped and released 13 December 1964. This bird carried a wing-tag in addition to its Fish and Wildlife band. At least one other wing-tagged bird was seen in the area at the same time but was not caught.

The N.E.-S.W. migration pattern observed corresponds to that reported in birds banded at Columbus, Ohio, (Burt and Giltz, 1966). Also, it compares to the trend noted by Kessel (1953) for

birds banded at other locations west of the Appalachian Mountains. Although Davis (1960) mentions migration north and south, these birds, too, follow a N.E.-S.W. pattern. A map of recoveries of birds banded in Baltimore, Maryland, (Davis, unpublished) verifies this direction. The bird banded in Washington, D. C., does not conform to this pattern, but since it was not a direct recovery, it is possible that the bird migrated farther northeast and returned southwest to our area.

Three hypotheses have been presented for the N.E.-S.W. migration trend. (1) The starlings follow their ancestral instinctive tendency (Burt and Giltz, 1966). (2) They adapt their routes to those of native species. (3) They follow the line of least resistance along river valleys and coastal plains. Study of a contour map of eastern United States shows that all the major topographic features are oriented in a N.E.-S.W. direction. Our N.E.-S.W. pattern would tend to support hypothesis (3). Further evidence to support hypothesis (3) is found in the fact that all of the recoveries in southeastern Pennsylvania occurred in valleys of rivers that either pass through central Pennsylvania or originate there.

SUMMARY

The migratory pattern of starlings (*Sturnus vulgaris*) was analyzed by recoveries from 8,058 birds captured and banded in central Pennsylvania (latitude 40°44'; Longitude 77°50'). As shown by 46 out-of-state recoveries, the migration follows a N.E.-S.W. pattern. Also, 53 recoveries within Pennsylvania follow this trend.

The capture of 18 starlings in both winter (November-February) and the breeding season (April-July) shows that some are permanent residents.

LITERATURE CITED

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- DAVIS, DAVID E. 1960. Comments on the migration of starlings in eastern United States. *Bird-Banding* **31**: 216-219.
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Received August, 1967.